Preliminary Data Report for Stormwater Runoff Samples Collected in Los Alamos Canyon above SR-4 at Gage E042 on October 12, 2000

A precipitation event occurred over the Jemez Mountains and the Pajarito Plateau on the afternoon and evening of October 11, 2000 and during the early morning hours of October 12. On October 12 meteorological stations across the plateau recorded a range of precipitation from 0.25 to 0.58 inches for the day. The station at TA-6 recorded a total of 0.47 inches and the station at TA-53 recorded a total of 0.49 inches. Remote Automated Weather Stations (RAWS) located on US Forest Service land in the Jemez Mountains recorded 0.28 inches in Pueblo Canyon, 0.49 inches in upper Los Alamos Canyon and 0.40 inches in Pajarito Canyon. Figure 1 shows the pattern of precipitation that was recorded in the Jemez Mountains and on the Pajarito Plateau on October 12.

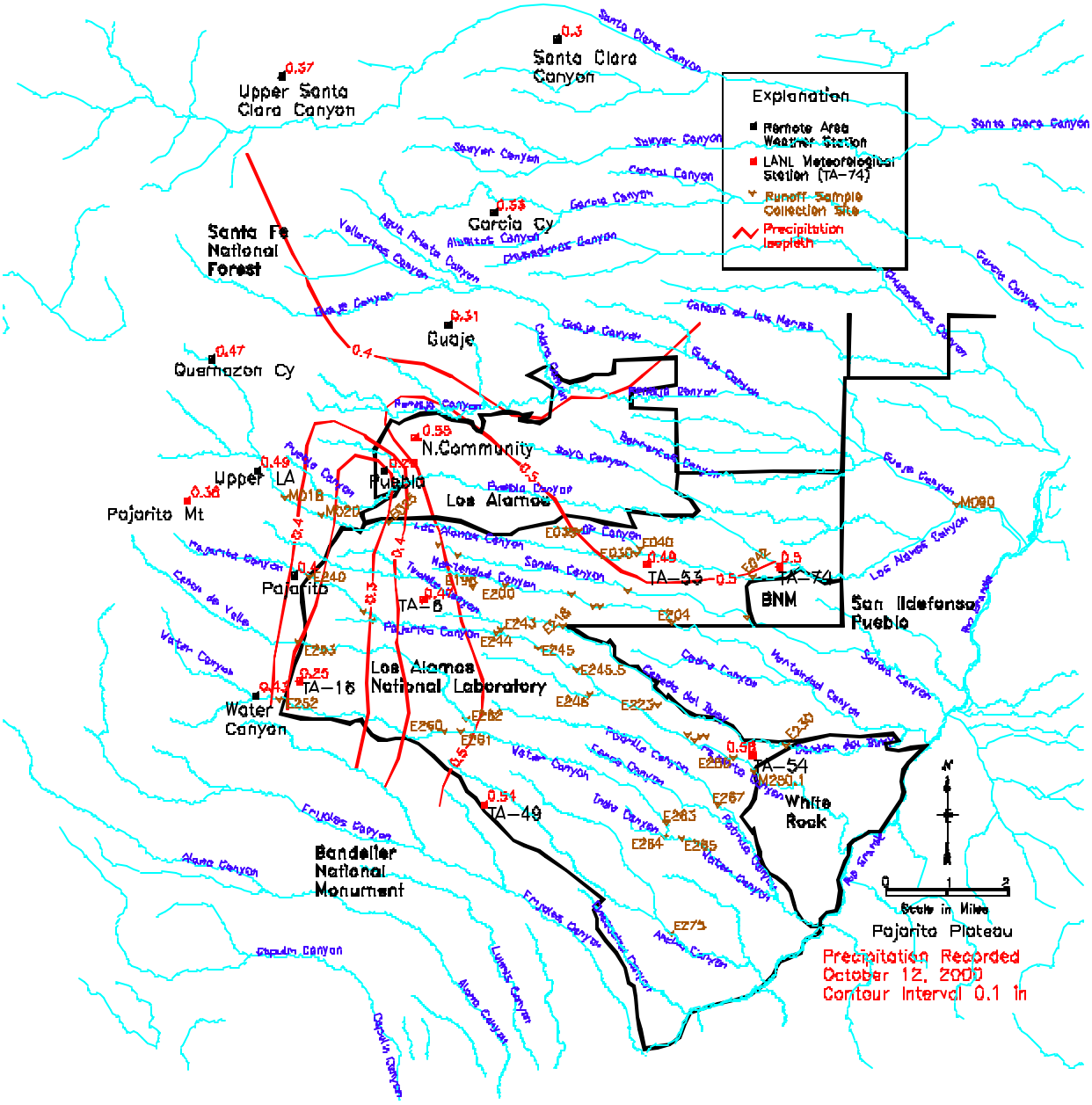

Figure 1. Precipitation recorded at meteorological stations on the Pajarito Plateau on October 12, 2000

During the precipitation event, stormwater runoff samples were collected in Los Alamos Canyon above SR-4 at gaging station E042. Automated samples were collected at 07:05 and 07:25 hours during the morning of October 12. Figure 2 shows the hourly precipitation recorded at the TA-6 and the TA-53 meteorological stations and the average hourly flow recorded at gage E042 on October 11 and 12, 2000. The maximum flow recorded at gage E042 was 3.79 cfs at 07:05 hours on the morning of October 12, at the time the runoff samples were collected.

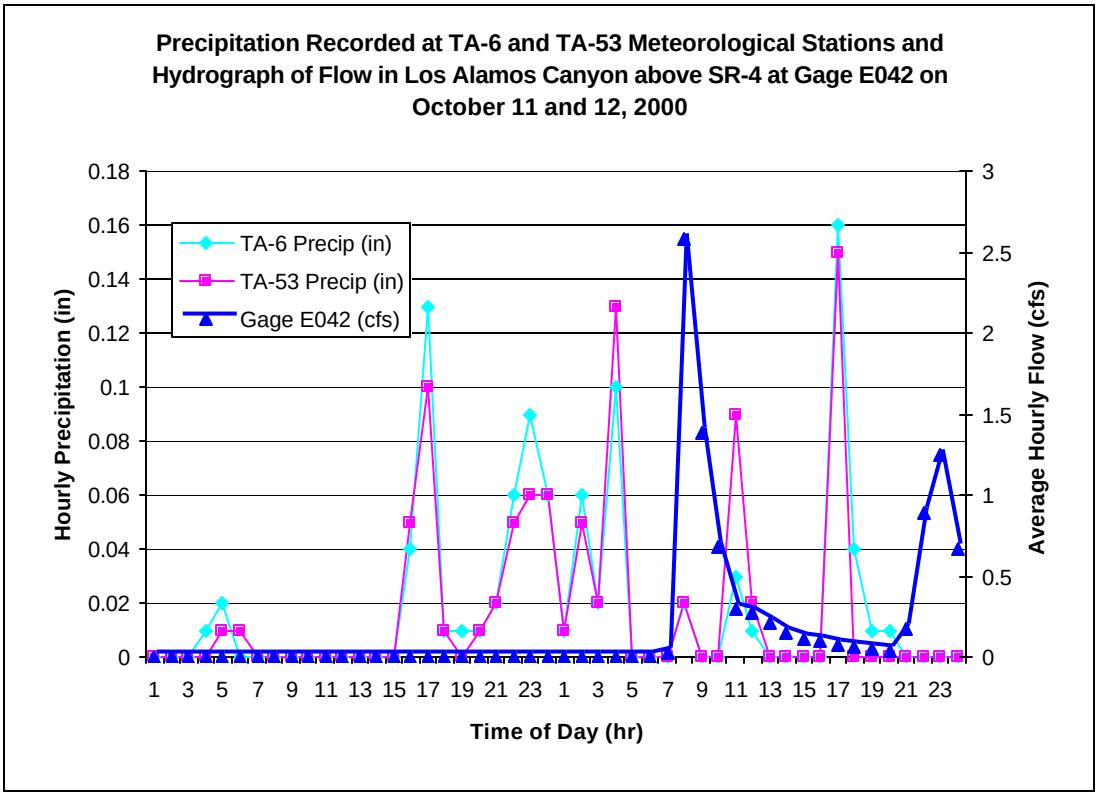

Figure 2. Precipitation recorded at TA-6 and TA-53 Meteorological Stations and Hydrograph of flow recorded in Los Alamos Canyon above SR-4 at Gage E042 on October 11 and 12, 2000.

Unfiltered samples were collected for analysis. The initial samples collected at 07:05 were sent to General Engineering Laboratories, Inc. in Charleston, South Carolina for analysis for radionuclides and general inorganic constituents. The second sample collected at 07:25 remained unfiltered for the analysis of total suspended sediment (TSS). Filtered samples were not collected.

Preliminary results of the available analyses for radionuclides are shown in Table 1. Also shown on Table 1 are the maximum values of constituents that have been recorded previous to the Cerro Grande Fire in unfiltered stormwater runoff at LANL (1995 through 1999), the DOE Public Dose Derived Concentration Guides (DCGs), and the available Environmental Restoration Project's Ecological Screening Level (ESL) for water; these values are presented for comparison purposes. Results of gamma spectroscopy are reported only for Am-241, Cs-137, and other radionuclides that were detected in concentrations above the laboratory method detection limit. A summary of the preliminary results of the analyses is shown in Figure 3. The results are compared with the historic maximum values obtained for unfiltered runoff and the DOE DCGs and the ESLs.

The radionuclide results obtained to date for the unfiltered samples collected from Los Alamos Canyon at E042 on October 12 are below the historic pre-fire maximum values and the DOE DCG values for each

analyte result obtained to date. Preliminary results obtained for Radium-226 were measured above the ESL value.

The unfiltered runoff sample collected at E042 on October 12, 2000 at 07:05 contained 1750 mg/L total suspended solids (TSS). Based on this sediment concentration and the activity of radionuclides measured in the unfiltered water samples, the concentrations of the radionuclides in the suspended sediment fraction of the runoff samples were calculated. These calculated values are also shown on Table 1 and the data are summarized in Figure 4. Values for radionuclides that were reported below the method detection limits are not shown on Figure 4.

The background values (BVs) that have been determined for stream sediments at Los Alamos National Laboratory (Ryti et al. 1998) and the calculated residential screening level (RSL) or soil for each radionuclide are also shown on Table 1. The RSL values were derived using DOE's RESRAD code and are based on a dose limit of 10 mrem/yr, which is less than the DOE free-release dose limit of 15 mrem/yr (LANL 2000). The maximum value of radionuclide concentrations observed in ash and muck sediment samples collected in June after precipitation events by the LANL ER Project are also shown on Table 1 (LANL 2000). The BVs for stream sediments, the RSLs, and the maximum ash and muck values are provided as a comparison for the results of the calculated activities of radionuclides in the suspended sediment fraction of the runoff samples. Suspended sediments in runoff samples are typically finer-grained than stream sediment samples; some radionuclides have been found to be preferentially located in finer grained sediments so direct comparison of the suspended sediment fraction of runoff samples with stream sediment BVs may not be appropriate, however the BVs, RSLs, and maximum values of ash and muck samples are provided here for reference and comparison.

The calculated radionuclide concentrations in the suspended sediment fraction of the samples are below the stream sediment BVs for all analyte results obtained to date except for Ra-226 and Sr-90. The calculated concentration of Sr-90 is also above the RSL and the ER ash and muck maximum values.

References

Los Alamos National Laboratory (LANL), 2000, "Post-Cerro Grande Fire Environmental Sampling Data: Baseline Ash and Muck Samples," Environmental Restoration (ER) Project report LA-UR 00-4362, September 2000, ER2000-0485. Preliminary data also presented on LANL ER Web site located at http://erproject.lanl.gov/Fire/Data/datahome.html

Ryti, R. T., P. A. Longmire, D. E. Broxton, S. L. Reneau, and E. V. McDonald, September 1998, "Inorganic and Radionuclide Background Data for Soils, Sediments and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory Report LA-UR-98-4847. (Ryti et al. 1998, 59730)

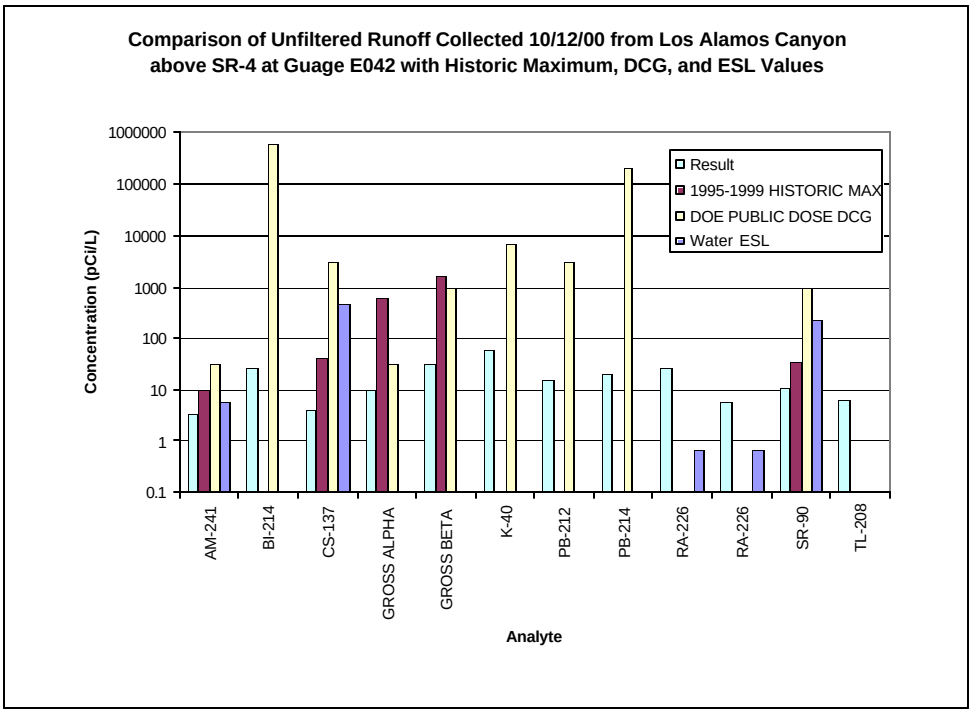

Figure 3. Comparison of runoff samples collected 10/12/00 in Los Alamos Canyon above SR-4 at Gage E042 with Historic Maximum, DCG Values, and Ecological Screening Levels

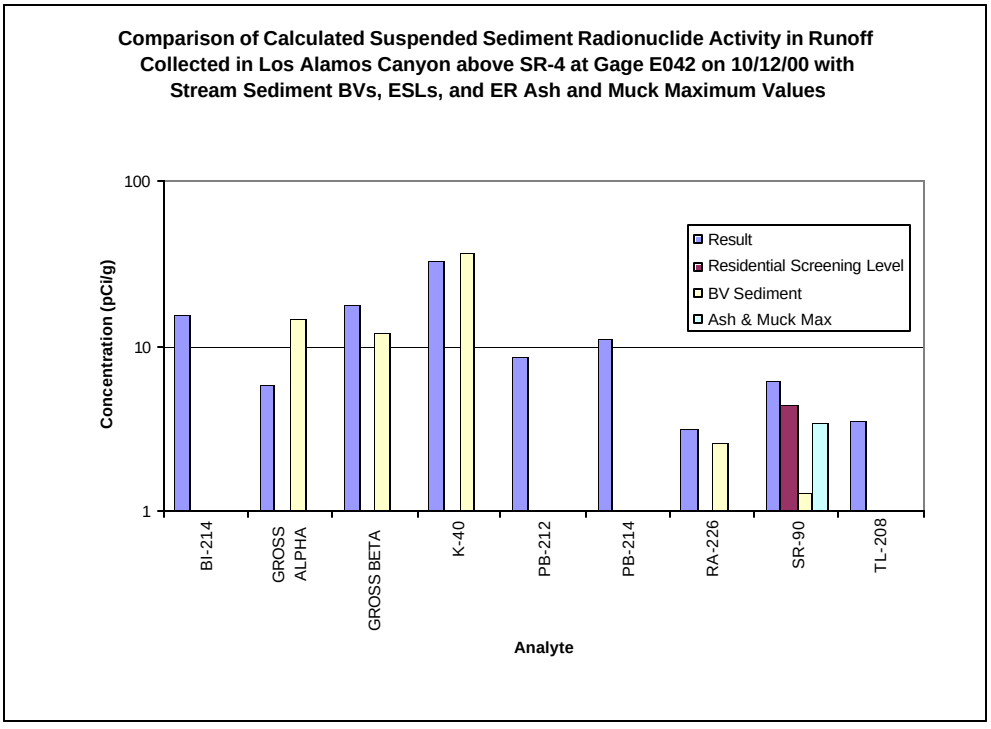

Figure 4. Comparison of calculated radionuclide activity in suspended sediment fraction of runoff samples collected 10/12/00 in Los Alamos Canyon above SR-4 at Gage E042 with residential screening levels, stream sediment BVs, and ER ash and muck maximum values obtained after the Cerro Grande Fire.

Table 1

RADIOACTIVE SCREENING MEASUREMENTS IN LOS ALAMOS CANYON ABOVE SR-4 AT GAGE E042 ON OCTOBER 12, 2000

DRAFT: DATA ARE PRELIMINARY

Canyon	Gage	Location	Sample ID	Lab Sample ID	Collection Date	F/UF	Collection Method	Sample Type	Analyte	Result	Units	TPU	DL	METHOD	QUALIFIER	COMMENT	1995-1999 HISTORIC MAX	DOE PUBLIC DOSE DCG	Water ESL
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	12-Oct-00	UF	A	SAMPLE	AM-241	3.39	pCi/L	6.71	22.9	GAMMA SPEC	U		10.288	30	5.8
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	12-Oct-00	UF	A	SAMPLE	BI-214	26.7	pCi/L	5.14	9.42	GAMMA SPEC				600000	
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	12-Oct-00	UF	A	SAMPLE	CS-137	4.25	pCi/L	2.1	4.5	GAMMA SPEC	U		42.28	3000	470
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32880009	12-Oct-00	UF	A	SAMPLE	GROSS ALPHA	10.3	pCi/L	1.52	1.61	GFPC			640.8	30	
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32880009	12-Oct-00	UF	A	SAMPLE	GROSS BETA	31.2	pCi/L	2.81	3.27	GFPC			1637	1000	
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	12-Oct-00	UF	A	SAMPLE	K-40	58.3	pCi/L	26	46.5	GAMMA SPEC				7000	
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	12-Oct-00	UF	A	SAMPLE	PB-212	15.1	pCi/L	4.03	7.32	GAMMA SPEC				3000	
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	12-Oct-00	UF	A	SAMPLE	PB-214	19.5	pCi/L	5.21	8.94	GAMMA SPEC				200000	
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	12-Oct-00	UF	A	SAMPLE	RA-226	26.7	pCi/L	5.14	9.42	GAMMA SPEC					0.68
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	12-Oct-00	UF	A	SAMPLE	RA-226	5.46	pCi/L	0.57	0.763	LUCAS CELL					0.68
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	12-Oct-00	UF	A	SAMPLE	SR-90	10.9	pCi/L	0.63	0.88	GFPC			36.76	1000	230
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	12-Oct-00	UF	A	SAMPLE	TL-208	6.18	pCi/L	2.16	4.47	GAMMA SPEC					
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32885009	12-Oct-00	UF	A	SAMPLE	CN AMEN	0	mg/L		0.0028	EPA 335.1	U	REPORTED ND			
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32885009	12-Oct-00	UF	A	SAMPLE	CN TOT	0	mg/L		0.0028	EPA 335.3	U	REPORTED ND			
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00102E042	32880006	12-Oct-00	UF	A	SAMPLE	TSS	1730	mg/L		11.7	EPA 160.2		AVERAGE OF 2			
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32880005	12-Oct-00	UF	A	SAMPLE	TSS	1750	mg/L		11.7	EPA 160.2		AVERAGE OF 2			

Calculated Suspended Sediment Concentrations of Radionuclides

Canyon	Gage	Location	Sample ID	Lab Sample ID	Collection Date	F/UF	Collection Method	Sample Type	Analyte	Result	Units	TPU		METHOD	QUALIFIER	COMMENT	Residential Screening Level	BV Sediment	Ash & Muck Max
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	10/12/00	UF	A	Calculated	AM-241	1.94	pCi/g	3.83		GAMMA SPEC	U		22	0.04	0.203
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	10/12/00	UF	A	Calculated	BI-214	15.26	pCi/g	2.94		GAMMA SPEC					
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	10/12/00	UF	A	Calculated	CS-137	2.43	pCi/g	1.2		GAMMA SPEC	U		5.1	0.9	5.16
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32880009	10/12/00	UF	A	Calculated	GROSS ALPHA	5.89	pCi/g	0.87		GFPC				14.8	
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32880009	10/12/00	UF	A	Calculated	GROSS BETA	17.83	pCi/g	1.61		GFPC				12	
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	10/12/00	UF	A	Calculated	K-40	33.31	pCi/g	14.9		GAMMA SPEC				36.8	
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	10/12/00	UF	A	Calculated	PB-212	8.63	pCi/g	2.3		GAMMA SPEC					
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	10/12/00	UF	A	Calculated	PB-214	11.14	pCi/g	2.98		GAMMA SPEC					
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	10/12/00	UF	A	Calculated	RA-226	3.12	pCi/g	0.33		LUCAS CELL				2.59	
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	10/12/00	UF	A	Calculated	SR-90	6.23	pCi/g	0.36		GFPC			4.4	1.3	3.48
Los Alamos	E042	Los Alamos Canyon above SR-4	GS00101E042	32882003	10/12/00	UF	A	Calculated	TL-208	3.53	pCi/g	1.23		GAMMA SPEC					

A or M: Automated or Manual (Grab) Sample
F/UF: filtered/unfiltered
Uncert.: 1 Stand. Dev.uncertainty in result
MDA or MDC: analytical method detection limit
TPU: Total Propogated Uncertainty
DUP: Laboratory Duplicate
DL = Detection Limit
RL = Reporting Limit

DCG = Derived Concentration Guide																	
ESL = Ecological Screening Level																	
RSL = Residential Screening Level. for soil based on RESRAD code using 10 mrem/yr																	
BV = Background Value (95/95 UTL)																	

Comparison of Calculated Suspended Sediment Radionuclide Activity in Runoff Collected in Los Alamos Canyon above SR-4 at Gage E042 on 10/12/00 with Stream Sediment BVs, ESLs, and ER Ash and Muck Maximum Values